Water, Earth, Fire and Air: how Trump can change the world

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President-elect Donald Trump has insinuated time and again on the campaign trail that he is interested in rolling back federal regulations on the coal industry. Now, he stands poised to build an administration that may not consider environmental issues as seriously as did his predecessors.

Tyler Stigall, Science and International Editor

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In the wake of the election night upset victory of Presidential-elect Donald Trump, conversations abounded over the implications of the new administration with respect to identity politics and minority rights. Media outlets spent days asking how they failed to predict the election.

Less talked about were the potential ramifications of a Trump presidency on environmental issues. As a Nov. 14 article from Mother Jones pointed out, his campaign rhetoric has been almost as hostile toward the environment as it has toward undocumented immigrants, Muslims and journalists.

His promises have included, among other things, canceling the United States' commitment to the international Paris Agreement, scrapping the Obama administration's Clean Power Plan, lifting regulatory standards on coal emissions and resuscitating the coal industry.

Environmental protections have gained new attention as Trump has begun filling his future cabinet this month. Fox News reported, on Dec. 7, that Trump has picked Oklahoma Attorney General Scott Pruitt to head the Environmental Protection Agency.

As attorney general, Pruitt has sued the EPA to contest regulations multiple times, and joined other Republicans to oppose the Clean Power Plan, according to Fox News. Pruitt, like Trump, has also been a proponent for the fossil fuel industry.

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This past week, The Campus interviewed faculty members of Allegheny College's environmental science department for their take on what the American landscape-both political and environmental-might look like under a Trump administration where campaign rhetoric may turn into policy and plan.

Scientists generally agree that the average global temperature has been rising since pre-industrial times. Most scientists agree that if global temperatures rise 2 degrees Celsius above what they were then, the effects will be disastrous, according to Matthew Bethurem, visiting assistant professor of environmental science.

The Paris Agreement, according to the agreement's website, has the long-term goal of keeping the average global temperature below this 2 degree threshold.

Today, scientists estimate the earth's temperatures as about 1 degree Celsius over pre-industrial levels, although exactly when "pre-industrial" refers to is up for debate, according to Bethurem.

"In the Paris Agreement-as it stands-the initial commitments are not nearly enough to bring us down to even the 2 degree point," Bethurem said.

Bethurem looks broadly at environmental policy with relation to climate change, or rising average global temperatures due to increased levels of carbon dioxide in the atmosphere. Most of his research involves studying policy at the state and local level.

"The Paris Agreement... from a U.S. perspective, can be seen as a symbolic action," Bethurem said. "The commitments we made in our pledge were targets that we were going to be close to hitting anyway."

Energy creation in the U.S. has seen a large shift from burning coal in power plants to burning natural gas. While both materials release carbon dioxide into the atmosphere when burned, natural gas tends to release less, thus reducing the average carbon footprint of each power plant that burns it instead of coal, according to Ian Carbone, assistant professor of environmental science.

The U.S. is currently considered the second highest emitter of carbon dioxide, behind China. According to Bethurem, the U.S. has not played major roles in previous international agreements-for example, the U.S. never ratified the Kyoto Protocol, a 1997 United Nations initiative for developed nations to reduce gas emissions.

The process for leaving the Paris agreement is meant to take a number of years, though no legal penalties currently exist for countries that withdraw from the agreement before that time. A potential U.S. cancelation could set a precedent for other nations involved, according to Bethurem. If the number two polluter in the world does not fulfill its commitment, the argument goes, what incentive do lesser nations have to fulfill theirs?

So far, other nations, including China, have signaled their intentions to remain in the agreement, even without U.S. support, Bethurem said.

Ben Haywood, assistant professor of environmental science, long suspected that Trump would have enough substantial support as a candidate, and followed his campaign rhetoric closely. He examined not just Trump's message but how his message was heard.

"In terms of the Paris Agreement, his [modus operandi] is that those international agreements stifle traditional energy industries like coal, and put [into place] regulations that prohibit economic growth," Haywood said. "That's how he sells his animosity toward these kinds of agreements."

Carbone was thinking of the global implications of a nullified Paris Agreement long before November.

"That was something that I saw and still see as being catastrophic for humanity," Carbone said. "A lot of people will suffer as a result of climate change, and the unfortunate reality is that the people who are most vulnerable to those impacts are the people without the money, resources and infrastructure to adapt to those changes."

Indeed, while one idea surrounding climate change is that only non-human organisms will be affected, most climate scientists agree that humans stand to lose the most.

Haywood said that poorer countries could suffer the most from a U.S. withdrawal. More carbon emissions could lead to more unpredictable natural disasters, such as droughts, from which under- or undeveloped regions could not recover.

Rising global temperatures, which have been attributed to an increase in atmospheric carbon due to industrializing nations, may also cause melting ice caps, which could lead to an overall rise in sea levels. Because of this, coastal communities are especially at risk, according to Bethurem.

Additionally, carbon in the atmosphere may end up in the oceans, acidifying the ocean and harming marine ecosystems. Seafood and fishing industries could lose much of their resources.

As Bethurem pointed out, the U.S. is already making progress in curbing its own carbon footprint. However, many of the U.S.'s federal regulations have also been targeted by Trump.

The Environmental Protection Agency, which had its origins in a federal initiative signed into law by Richard Nixon, exists on the pretense that human activity has a measurable impact on the environment.

In the past, Trump has repeatedly said that man-made climate change is a hoax.

In a tweet from Nov. 6, 2012, he said, "The concept of global warming was created by and for the Chinese in order to make U.S. manufacturing non-competitive."

On Jan. 18 of this year, during a segment on "Fox and Friends," Trump asserted that he had meant the tweet as a joke.

In another tweet from Jan. 25, 2014, he said, "NBC news just called it the great freeze - coldest weather in years. Is our country still spending money on the GLOBAL WARMING HOAX?"

Richard Bowden, professor of environmental science, said that the idea of a changing climate was proposed in 1899 by the Swedish chemist and Nobel Prize winner Svante Arrhenius. According to NASA's website, Arrhenius was the first scientist to ask whether carbon dioxide emissions could affect the global climate.

"I'm not sure that the Swedes and the Chinese were collaborating at that time," Bowden said.

A potential White House stance that climate change is a hoax could justify cutting EPA-guided regulations on carbon dioxide emissions and other hazards.

The Clean Power Plan is one such policy. Created by President Obama and the EPA, the plan aims to reduce carbon emissions from existing power plants. This would incentivize energy companies to invest in and develop cleaner forms of energy.

Critics of the plan-including Trump-have focused on the fact that it harms old forms of energy, including coal and gas.

Carbone, who studies new forms of solar energy, understands that the efficacy of a policy hinges on how it is enforced.

"The EPA is the organization which enforces virtually all of our environmental and federal regulations," Carbone said. "Tied in with the EPA is the fact that the Supreme Court is going to decide whether or not we can follow through the Obama administration's Clean Power Plan."

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Most of Trump's rhetoric seems to point to a laissez-faire federal government under the new administration. In a video released by Trump on YouTube on Nov. 21, Trump outlined his plans for the first 100 days of his administration, which included a promise to shrink the scope of federal regulation.

"I will formulate a rule, which says that for every one new regulation, two old regulations must be eliminated," Trump said in his video.

Bethurem said that a weakened EPA would mean "lots of bad things" for the American public.

"A couple of primary regulatory laws that the EPA is in control of-the Clean Air Act and the Clean Water Act-have made drastic improvements to American environmental conditions," Bethurem said. "Our water is cleaner than it once was, and our air is cleaner."

To pull back from full enforcement of those regulations would mean seeing air and water conditions worsen, according to Bethurem.

Bowden does not see carbon emission regulation as a threat to American jobs. Trump's campaign rhetoric has framed the question as an either/or between environmental safeguarding and a revitalized energy industry.

The problem with this dichotomy is that more Americans are employed by the renewable energy sector than by the coal industry, according to Bowden. About 66,000 people are employed by coal companies, while hundreds of thousands get their pay from renewable energy.

For the most part, the invisible hand of the free market seems to be slowly pushing coal off the table, according to most of the professors interviewed.

"[Fossil fuel] industries are already dying because we are finding cleaner and more innovative ways to produce energy, and with new technology, the costs of those are coming down rapidly," Haywood said. "From an economic standpoint, coal in the long term is not going to make a lot of sense."

Haywood said that many countries in Europe and South America are producing cost-efficient methods of energy production, which may out-compete coal as a natural resource. Even in the U.S., the industry is shrinking. The largest coal company in the U.S., Peabody Energy, declared bankruptcy last year, according to Carbone.

Bowden agreed that the American economy would benefit from investing in new forms of energy.

"Trump is right in that we need energy to drive a modern economy," Bowden said. "Most economists and industrial experts are saying that coal will probably never be a big gain. Natural gas though still a fossil fuel, is much cheaper than coal."

More importantly, Bowden said, renewable energy is slowly becoming cheaper per kilowatt-hour-a unit of energy measurement-than fossil fuels, without much federal subsidy. Renewable energy sources include solar energy, wind, hydroelectric and biomass or burning wood.

Coal-powered energy is not just unviable economically, according to Bowden. The consequences of coal production are devastating to the environment.

"The science industry is damning to the coal industry," Bowden said.

Coal mining often involves mountaintop removal, which works exactly as it sounds-the tops of mountains are leveled and valleys are filled. This practice destroys waterways and the associated ecosystems.

Additionally, as coal is burned, sulfur and mercury, which are trapped within the raw extract, are released into the atmosphere. Sulfur combines with air and water to form sulfuric acid, which is a component of acid rain.

Acid rain can alter the chemical balance of soil, causing the death of living things that depend on the soil. It can also acidify water habitats, impacting the ability of fish to take in nutrients.

"Anybody who breathes should be concerned about particulates in the atmosphere," Bowden said. "Anyone who drinks water or eats fish should be concerned about mercury composition. Mercury is found in coal, and when coal is burned it gets released into the air."

In terms of pollutants, natural gas tends to be cleaner than coal. Burning natural gas releases less carbon dioxide and mercury in the air when burned, according to Carbone. Haywood agreed that natural gas is a better form of energy production than coal, so long as it remains well-regulated.

Nuclear power, like coal, is slowly becoming less cost-competitive as well. Hydroelectric power, while clean and renewable, has been in use for almost a century, according to Carbone, leaving little room for expansion.

Solar and wind energy are the safest and most cost-effective forms of energy production in every way, save two: the upfront costs of building infrastructure, and the intermittency of the resources involved-when the wind stops blowing and the sun is not shining.

"Nuclear power is controversial because if it goes bad, it goes really bad, and the harmful materials can hang around for thousands of years," Carbone said. "But I definitely see it as a good option if we're looking to buy some time before other forms of energy production become more developed."

Brittany Davis, assistant professor of environmental science and black studies, teaches on topics of environmental justice. In her work, Davis studies how certain communities bear the costs of environmental and waste-management policies more than others.

"There are lots of environmental costs to things we consider essential to society," Davis said. "The benefits are received by people who enjoy them, but the costs and waste production are disproportionately affecting some more than others."

For example, landfills and chemical wastes are often built in or near poorer communities that do not have the financial or political resources to fight back, according to Davis. At an international level, electronic waste is often shipped out to poorer countries, whose people have to dispose of dangerous chemical components on their own.

"In terms of environmental justice, there has been very little of it at the federal level," Davis said. "I'm not sure that one president can make that worse, if it isn't happening."

Less than 5 percent of all legal cases related to environmental justice succeed in federal court, and less than 0.2 percent of all Title IX complaints have succeeded in showing discriminating environmental policies against poor or minority areas, according to Davis.

Davis said that the issue of immigration, long debated in the presidential race, is also related to climate change. As sea levels rise, inhabitants of low-level island nations often flee to other countries to seek asylum.

"With the increase in anti-immigration rhetoric in the country, it [looks] more unlikely that we would be willing to take in climate change refugees," Davis said. "We already decline to take people in for humanitarian reasons."

Davis said that she sees this election as a good opportunity for activism. She hopes to see more widespread solutions offered, such as rethinking the transportation infrastructure of the U.S. to lower emissions, rather than just improving the fuel efficiency of cars.

"Republican presidents haven't been universally awful to the environment-only some of them [have]," Davis said. "Democrat presidents haven't been amazing either, because the problem is capitalism and the problem is our way of life."

Beth Choate, assistant professor of environmental science, said she wishes that more time had been spent focusing on climate change during the general election by both the media and by the candidates. She said that she was concerned that climate scientists were often depicted as threatening to the American economy.

"People were concerned with their livelihood," Choate said. "That was a big takeaway from the campaign for me- people feel like they haven't been taken care of by the government. When you're worrying about your livelihood, you're spending less time caring about the environment."

Choate said that one of her biggest concerns as a scientist is the future of federally-funded scientific research, particularly in the vein of climate science. She said she was also worried about the future of the Farm Bill.

Passed in the early twentieth century, the Farm Bill provides subsidies to farmers. The bill is also responsible for Supplemental Nutrition Assistance Program benefits, according to Choate, who also said she is concerned that federal subsidies paid out to organic or environmentally-friendly farmers may be targeted as well.

Choate also hopes that the public's trust in scientists will not be marred by November's election results.

"We've come a long way in admitting that humans are at fault in some way [for climate change], and I worry about all of that hard work being retracted," Choate said. "As someone who does science for a living, I worry about this idea that 'perhaps we can't trust scientists.'"

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